

VII. COMPLIANCE AND ENFORCEMENT HISTORY

Background

To date, EPA has focused much of its attention on measuring compliance with specific environmental statutes. This approach allows the Agency to track compliance with the Clean Air Act, the Resource Conservation and Recovery Act, the Clean Water Act, and other environmental statutes. Within the last several years, the Agency has begun to supplement single-media compliance indicators with facility-specific, multimedia indicators of compliance. In doing so, EPA is in a better position to track compliance with all statutes at the facility level, and within specific industrial sectors.

A major step in building the capacity to compile multimedia data for industrial sectors was the creation of EPA's Integrated Data for Enforcement Analysis (IDEA) system. IDEA has the capacity to "read into" the Agency's single-media databases, extract compliance records, and match the records to individual facilities. The IDEA system can match Air, Water, Waste, Toxics/Pesticides/EPCRA, TRI, and Enforcement Docket records for a given facility, and generate a list of historical permit, inspection, and enforcement activity. IDEA also has the capability to analyze data by geographic area and corporate holder. As the capacity to generate multimedia compliance data improves, EPA will make available more in-depth compliance and enforcement information. Additionally, sector-specific measures of success for compliance assistance efforts are under development.

Compliance and Enforcement Profile Description

Using inspection, violation and enforcement data from the IDEA system, this section provides information regarding the historical compliance and enforcement activity of this sector. In order to mirror the facility universe reported in the Toxic Chemical Profile, the data reported within this section consists of records only from the TRI reporting universe. With this decision, the selection criteria are consistent across sectors with certain exceptions. For the sectors that do not normally report to the TRI program, data have been provided from EPA's Facility Indexing System (FINDS) which tracks facilities in all media databases. Please note, in this section, EPA does not attempt to define the actual number of facilities that fall within each sector. Instead, the section portrays the records of a subset of facilities within the sector that are well defined within EPA databases.

As a check on the relative size of the full sector universe, most notebooks contain an estimated number of facilities within the sector according to the

Bureau of Census (See Section II). With sectors dominated by small businesses, such as metal finishers and printers, the reporting universe within the EPA databases may be small in comparison to Census data. However, the group selected for inclusion in this data analysis section should be consistent with this sector's general make-up.

Following this introduction is a list defining each data column presented within this section. These values represent a retrospective summary of inspections or enforcement actions, and solely reflect EPA, state and local compliance assurance activity that have been entered into EPA databases. To identify any changes in trends, the EPA ran two data queries, one for the past five calendar years (August 10, 1990 to August 9, 1995) and the other for the most recent twelve-month period (August 10, 1994 to August 9, 1995). The five-year analysis gives an average level of activity for that period for comparison to the more recent activity.

Because most inspections focus on single-media requirements, the data queries presented in this section are taken from single media databases. These databases do not provide data on whether inspections are state/local or EPA-led. However, the table breaking down the universe of violations does give the reader a crude measurement of the EPA's and states' efforts within each media program. The presented data illustrate the variations across regions for certain sectors.^e This variation may be attributable to state/local data entry variations, specific geographic concentrations, proximity to population centers, sensitive ecosystems, highly toxic chemicals used in production, or historical noncompliance. Hence, the exhibited data do not rank regional performance or necessarily reflect which regions may have the most compliance problems.

Compliance and Enforcement Data Definitions

General Definitions

Facility Indexing System (FINDS) -- this system assigns a common facility number to EPA single-media permit records. The FINDS identification number allows EPA to compile and review all permit, compliance, enforcement and pollutant release data for any given regulated facility.

EPA Regions include the following states: I (CT, MA, ME, RI, NH, VT); II (NJ, NY, PR, VI); III (DC, DE, MD, PA, VA, WV); IV (AL, FL, GA, KY, MS, NC, SC, TN); V (IL, IN, MI, MN, OH, WI); VI (AR, LA, NM, OK, TX); VII (IA, KS, MO, NE); VIII (CO, MT, ND, SD, UT, WY); IX (AZ, CA, HI, NV, Pacific Trust Territories); X (AK, ID, OR, WA).

Integrated Data for Enforcement Analysis (IDEA) -- is a data integration system that can retrieve information from the major EPA program office databases. IDEA uses the FINDS identification number to "glue together" separate data records from EPA's databases. This is done to create a "master list" of data records for any given facility. Some of the data systems accessible through IDEA are: AIRS (Air Facility Indexing and Retrieval System, Office of Air and Radiation), PCS (Permit Compliance System, Office of Water), RCRIS (Resource Conservation and Recovery Information System, Office of Solid Waste), NCDB (National Compliance Data Base, Office of Prevention, Pesticides, and Toxic Substances), CERCLIS (Comprehensive Environmental and Liability Information System, Superfund), and TRIS (Toxic Release Inventory System). IDEA also contains information from outside sources such as Dun and Bradstreet and the Occupational Safety and Health Administration (OSHA). Most data queries displayed in notebook sections IV and VII were conducted using IDEA.

Data Table Column Heading Definitions

Facilities in Search -- are based on the universe of TRI reporters within the listed SIC code range. For industries not covered under TRI reporting requirements, the notebook uses the FINDS universe for executing data queries. The SIC code range selected for each search is defined by each notebook's selected SIC code coverage described in Section II.

Facilities Inspected -- indicates the level of EPA and state agency facility inspections for the facilities in this data search. These values show what percentage of the facility universe is inspected in a 12 or 60 month period. This column does not count non-inspectional compliance activities such as the review of facility-reported discharge reports.

Number of Inspections -- measures the total number of inspections conducted in this sector. An inspection event is counted each time it is entered into a single media database.

Average Time Between Inspections -- provides an average length of time, expressed in months, that a compliance inspection occurs at a facility within the defined universe.

Facilities with One or More Enforcement Actions -- expresses the number of facilities that were party to at least one enforcement action within the defined time period. This category is broken down further into federal and state actions. Data are obtained for administrative, civil/judicial, and criminal enforcement actions. Administrative actions include Notices of Violation (NOVs). A facility with multiple

enforcement actions is only counted once in this column (facility with three enforcement actions counts as one). All percentages that appear are referenced to the number of facilities inspected.

Total Enforcement Actions -- describes the total number of enforcement actions identified for an industrial sector across all environmental statutes. A facility with multiple enforcement actions is counted multiple times (a facility with three enforcement actions counts as three).

State Lead Actions -- shows what percentage of the total enforcement actions are taken by state and local environmental agencies. Varying levels of use by states of EPA data systems may limit the volume of actions accorded state enforcement activity. Some states extensively report enforcement activities into EPA data systems, while other states may use their own data systems.

Federal Lead Actions -- shows what percentage of the total enforcement actions are taken by the United States Environmental Protection Agency. This value includes referrals from state agencies. Many of these actions result from coordinated or joint state/federal efforts.

Enforcement to Inspection Rate -- expresses how often enforcement actions result from inspections. This value is a ratio of enforcement actions to inspections and is presented for comparative purposes only. This measure is a rough indicator of the relationship between inspections and enforcement. This measure simply indicates historically how many enforcement actions can be attributed to inspection activity. Reported inspections and enforcement actions under the Clean Water Act (CWA), the Clean Air Act (CAA) and the Resource Conservation and Recovery Act (RCRA) are included in this ratio. Inspections and actions from the TSCA/FIFRA/EPCRA database are not factored into this ratio because most of the actions taken under these programs are not the result of facility inspections. This ratio does not account for enforcement actions arising from non-inspection compliance monitoring activities (e.g., self-reported water discharges) that can result in enforcement action within the CAA, CWA and RCRA.

Facilities with One or More Violations Identified -- indicates the number and percentage of inspected facilities having a violation identified in one of the following data categories: In Violation or Significant Violation Status (CAA); Reportable Noncompliance, Current Year Noncompliance, Significant Noncompliance (CWA); Noncompliance and Significant Noncompliance (FIFRA, TSCA, and EPCRA); Unresolved Violation and Unresolved High Priority Violation (RCRA). The values presented for this column reflect the extent of noncompliance within the

measured time frame, but do not distinguish between the severity of the noncompliance. Percentages within this column can exceed 100 percent because facilities can be in violation status without being inspected. Violation status may be a precursor to an enforcement action, but does not necessarily indicate that an enforcement action will occur.

Media Breakdown of Enforcement Actions and Inspections -- four columns identify the proportion of total inspections and enforcement actions within EPA Air, Water, Waste, and TSCA/FIFRA/EPCRA databases. Each column is a percentage of either the "Total Inspections," or the "Total Actions" column.

VII.A. Petroleum Refining Compliance History

Exhibit 24 provides an overview of the reported compliance and enforcement data for the refining industry over the past five years (August 1990 to August 1995). These data are also broken out by EPA Region thereby permitting geographical comparisons. A few points evident from the data are listed below.

- Almost all of the facilities identified in the database search were inspected in the past five years. These facilities were inspected on average every three months.
- The ratio of enforcement actions to inspections varied widely between Regions over the past five years with little or no direct correlation to the number of facilities in the Region or the proportion of state lead versus federal lead actions.
- Those facilities with one or more enforcement actions had, on average, over the five year period, almost eight enforcement actions brought against them.

VII.B. Comparison of Enforcement Activity Between Selected Industries

Exhibits 25 and 26 allow the compliance history of the petroleum refining sector to be compared to the other industries covered by the industry sector notebooks. Comparisons between Exhibits 25 and 26 permit the identification of trends in compliance and enforcement records of the industry by comparing data covering the last five years to that of the past year. Some points evident from the data are listed below.

- Of those sectors listed, the petroleum refining industry has been the most frequently inspected industry over the past five years.
- The industry has a relatively large proportion of facilities with violations and enforcement actions, in comparison to the other sectors.
- The rate of enforcement actions per inspection for the industry is relatively high, and has changed little over the past year.

Exhibits 27 and 28 provide a more in-depth comparison between petroleum refining industry and other sectors by breaking out the compliance and enforcement data by environmental statute. As in the previous Exhibits (Exhibits 25 and 26), the data cover the last five years (Exhibit 27) and the last one year (Exhibit 28) to facilitate the identification of recent trends. A few points evident from the data are listed below.

- The number of inspections carried out under each environmental statute as a percent of the total has changed little between the average of the past five years and that of the past year. Inspections under CAA appear to be slightly more frequent while inspections under RCRA appear to be slightly less frequent.
- The distribution of enforcement actions between statutes has also changed very little between the past five years and one year. Enforcement actions under RCRA decreased slightly while enforcement actions under CWA have increased slightly.

VII.C. Review of Major Legal Actions

Major Cases/Supplemental Environmental Projects

This section provides summary information about major cases that have affected this sector, and a list of Supplementary Environmental Projects (SEPs). SEPs are compliance agreements that reduce a facility's stipulated penalty in return for an environmental project that exceeds the value of the reduction. Often, these projects fund pollution prevention activities that can significantly reduce the future pollutant loadings of a facility.

VII.C.1. Review of Major Cases

Historically, OECA's Enforcement Capacity and Outreach Office does not regularly compile information related to major cases and pending litigation within an industry sector. The staff are willing to pass along such information to Agency staff as requests are made. (Office of Enforcement Capacity and Outreach 202-260-4140) In addition, summaries of completed enforcement actions are published each fiscal year in the Enforcement Accomplishments Report. To date, these summaries are not organized by industry sector. (Contact: Robert Banks, 202-260-8296)

VII.C.2. Supplementary Environmental Projects

Supplemental environmental projects (SEPs) are an enforcement option that requires the non-compliant facility to complete specific projects. Regional summaries of SEPs undertaken in the 1993 and 1994 federal fiscal years were reviewed. Eleven projects were undertaken that involved petroleum refineries, as shown in the following table.

In the petroleum refinery sector, no single statute engendered the majority of SEPs. Due to differences in regional descriptions, the specifics of the original violations are not known. Overall, Clean Air Act (CAA) violations were the most common amongst petroleum refineries; even so, only three out of the ten projects were due to CAA violations.

The SEPs in the petroleum refinery sector can be grouped into four categories:

- **Process change.** Two SEPs involved the discontinuation of particular crude oil units that generated regulated waste streams. Costs to companies were \$3,200,000 and \$2,000,000, respectively, the most costly of all petroleum refinery SEPs.

- **Leak prevention.** Facilities improved leak detection and prevention technologies in piping or tanks as the result of four projects. Original violations for these SEPs were RCRA, CAA, and the Oil Pollution Act (OPA). Cost to company ranged from \$265,000 to \$800,000.
- **Control technology improvement/installation.** The three CAA related original violations all had control technology improvements or installations as projects. Sulfuric air emissions (H_2S , SO_2) were reduced in two cases (a reduction of 274 tons/year of SO_2) and opacity monitoring was initiated in the third case. Cost to company ranged from \$85,000 to \$270,000.
- **Non-process related projects.** Some SEPs involved projects that were not directly related to the petroleum refining process. In one case, PCB-containing transformers were removed as the result of a TSCA violation. Other cases involved equipment donations to Local Emergency Planning Commissions due to CERCLA non-reporting violations. Cost to company ranged from \$9,000 to \$19,000.

VIII. COMPLIANCE ASSURANCE ACTIVITIES AND INITIATIVES

This section highlights the activities undertaken by this industry sector and public agencies to voluntarily improve the sector's environmental performance. These activities include those independently initiated by industrial trade associations. In this section, the notebook also contains a listing and description of national and regional trade associations.

VIII.A. Sector-Related Environmental Programs and Activities

Common Sense Initiative

The EPA's Common Sense Initiative (CSI) was announced in November of 1993 to encourage pollution prevention in a few pilot industrial sectors including: iron and steel, electronics, metal plating and finishing, automobiles, printing, and petroleum refining. The program shifts regulatory focus from concentrating on individual pollutants and media, to industry-wide approaches to environmental problems. An EPA team has been assigned to each industry and a strategic plan will be drawn up to identify opportunities to coordinate rulemaking and to streamline record-keeping and permitting requirements. The teams are working with industry to identify innovative approaches in pollution prevention and environmental technology. Co-chairs for the Petroleum Refining Committee are Elliot Laws, Assistant Administrator for the Office of Solid Waste and Emergency Response; and Jane Saginaw, Regional Administrator - Region VI. Starting in November of 1994, meetings of most stakeholders including EPA and other government officials, industry representatives, and environmental groups, have been held to explain the Initiative and its goals as well as to exchange ideas on how to best prevent pollution in the petroleum refining industry. (Contact: Petroleum Refining Team Leaders, Meg Kelly, Office of Solid Waste and Emergency Response, 703-308-8800; Gerald Fontenot, Region VI - Air Branch, 214-665-7205; and OECA staff lead, Tom Ripp, 202-564-7003.)

EPA Regional Compliance and Enforcement Activities

A number of regions have focused on enforcement and compliance activities that affect the petroleum refining sector. Region V is currently carrying out a geographic enforcement initiative which includes the petroleum refining industry (Contact: Reg Pallesen, 312-886-0555). In addition, the EPCRA program of Region V conducts a minimum of six outreach training sessions annually, one in each state, which cover all industries. In Region VIII the NPDES Branch began an enforcement initiative aimed at petroleum refineries in FY94. The initiative addresses surface water and groundwater contamination by focusing on the prevention and elimination of future discharges. The RCRA branch of

Region VIII is developing a program for FY95 that includes forming a Multi-Media Refinery Workgroup that will integrate its activities with the Common Sense Initiative Workgroup. One of the issues to be examined by the workgroup are integrated permits for watersheds. Region IX is working with the National Enforcement Investigation Center on a multi-media petroleum refining enforcement initiative.

VIII.B. EPA Voluntary Programs

33/50 Program

The "33/50 Program" is EPA's voluntary program to reduce toxic chemical releases and transfers of seventeen chemicals from manufacturing facilities. Participating companies pledge to reduce their toxic chemical releases and transfers by 33 percent as of 1992 and by 50 percent as of 1995 from the 1988 baseline year. Certificates of Appreciation have been given out to participants meeting their 1992 goals. The list of chemicals includes seventeen high-use chemicals reported in the Toxics Release Inventory. Exhibit 30 lists those companies participating in the 33/50 program that reported the SIC code 2911 to TRI. Many of the companies shown listed multiple SIC codes and, therefore, are likely to carry out operations in addition to petroleum refining. The SIC codes reported by each company are listed in no particular order. In addition, the number of facilities within each company that are participating in the 33/50 program and that report SIC 2911 to TRI are shown. Finally, each company's total 1993 releases and transfers of 33/50 chemicals and the percent reduction in these chemicals since 1988 are presented.

The petroleum refining industry as a whole used, generated or processed all seventeen target TRI chemicals. Of the target chemicals, benzene, toluene, xylene and methyl ethyl ketone are released and transferred most frequently and in similar quantities. These four toxic chemicals account for about 5 percent of TRI releases and transfers from petroleum refining facilities. Twenty six companies listed under SIC 2911 are currently participating in the 33/50 program. They account for 29 percent of the 91 companies carrying out petroleum refining operations, which is significantly higher than the average for all industries of 14 percent participation. Exhibit 30 also shows that within these 26 companies, 99 facilities reporting SIC 2911 are participating in the 33/50 program. This comprises about 62 percent of the petroleum refining facilities reporting to TRI. (For more information, contact: Mike Burns, 202-260-6394 or the 33/50 Program 202-260-6907)

Exhibit 30: 33/50 Program Participants Reporting SIC 2911 (Petroleum Refining)					
Parent Company	City, State	SIC Codes Reported	Number of Participating Facilities	1993 Releases and Transfers (lbs)	% Reduction 1988 to 1993
Amerada Hess Corporation	New York, NY	2911, 5171	4	1,286,125	50
American Petrofina Holding Co.	Dallas, TX	2911	2	747,799	40
Amoco Corporation	Chicago, IL	2911, 2951, 2992	7	4,632,163	50
Ashland Oil Inc.	Russell, KY	2911	3	723,562	50
Atlantic Richfield Company	Los Angeles, CA	2911	3	2,435,248	2
BHP Holdings (USA) Inc.	San Francisco, CA	2911	1	64,365	***
BP America Inc.	Cleveland, OH	2911	5	1,597,404	24
Chevron Corporation	San Francisco, CA	2911	11	2,794,502	50
Cibro Petroleum Bronx Inc.	Bronx, NY	2911, 5171	1	4,025	***
Citgo Petroleum Corporation	Tulsa, OK	2911	2	1,164,354	20
Clark USA Inc.	Saint Louis, MO	2911	2	33,982	***
E. I. Du Pont De Nemours & Co	Wilmington, DE	2911	4	11,740,853	50
Exxon Corporation	Irving, TX	2911, 5171	5	2,469,930	50
Kerr-McGee Corporation	Oklahoma City, OK	2911	3	374,098	35
Mobil Corporation	Fairfax, VA	2911, 2869	6	4,263,284	50
New Street Capital Corporation	Atlanta, GA	2911	1	2,544	50
Pennzoil Company	Houston, TX	2911	3	2,594,107	30
Phillips Petroleum Company	Bartlesville, OK	2911, 2819	4	2,367,877	50
Quaker State Corporation	Oil City, PA	2911, 2992	1	292,587	6
Shell Petroleum Inc.	Houston, TX	2911, 2869	6	3,240,716	55
Star Enterprise	Houston, TX	2911	5	601,640	50
Sun Company Inc.	Radnor, PA	2911	5	2,826,737	50
Texaco Inc.	White Plains, NY	2911	5	514,803	50
Unocal Corporation	Los Angeles, CA	2911	4	238,520	50
USX Corporation	Pittsburgh, PA	2911	5	1,510,772	25
Witco Corporation	New York, NY	2911	1	327,611	50
* = not quantifiable against 1988 data.					
** = use reduction goal only.					
*** = no numerical goal.					
Source: U.S. EPA, Toxics Release Inventory, 1993.					

Environmental Leadership Program

The Environmental Leadership Program (ELP) is a national initiative piloted by EPA and state agencies in which facilities have volunteered to demonstrate innovative approaches to environmental management and compliance. EPA has selected 12 pilot projects at industrial facilities and federal installations which will demonstrate the principles of the ELP program. These principles include: environmental management systems,

multimedia compliance assurance, third-party verification of compliance, public measures of accountability, community involvement, and mentoring programs. In return for participating, pilot participants receive public recognition and are given a period of time to correct any violations discovered during these experimental projects. At present, no petroleum refineries are carrying out ELP pilot projects. (Contact: Tai-ming Chang, ELP Director 202-564-5081 or Robert Fentress 202-564-7023)

Project XL

Project XL was initiated in March 1995 as a part of President Clinton's *Reinventing Environmental Regulation* initiative. The projects seek to achieve cost effective environmental benefits by allowing participants to replace or modify existing regulatory requirements on the condition that they produce greater environmental benefits. EPA and program participants will negotiate and sign a Final Project Agreement, detailing specific objectives that the regulated entity shall satisfy. In exchange, EPA will allow the participant a certain degree of regulatory flexibility and may seek changes in underlying regulations or statutes. Participants are encouraged to seek stakeholder support from local governments, businesses, and environmental groups. EPA hopes to implement fifty pilot projects in four categories including facilities, sectors, communities, and government agencies regulated by EPA. Applications will be accepted on a rolling basis and projects will move to implementation within six months of their selection. For additional information regarding XL Projects, including application procedures and criteria, see the May 23, 1995 Federal Register Notice. (Contact Jon Kessler at EPA's Office of Policy Analysis 202-260-4034)

Green Lights Program

EPA's Green Lights program was initiated in 1991 and has the goal of preventing pollution by encouraging U.S. institutions to use energy-efficient lighting technologies. The program has over 1,500 participants which include major corporations; small and medium sized businesses; federal, state and local governments; non-profit groups; schools; universities; and health care facilities. Each participant is required to survey their facilities and upgrade lighting wherever it is profitable. EPA provides technical assistance to the participants through a decision support software package, workshops and manuals, and a financing registry. EPA's Office of Air and Radiation is responsible for operating the Green Lights Program. (Contact: Maria Tikoff at 202-233-9178 or the Green Light/Energy Star Hotline at 202-775-6650)

WasteWi\$e Program

The WasteWi\$e Program was started in 1994 by EPA's Office of Solid Waste and Emergency Response. The program is aimed at reducing municipal solid wastes by promoting waste minimization, recycling collection and the manufacturing and purchase of recycled products. As of 1994, the program had about 300 companies as members, including a number of major corporations. Members agree to identify and implement actions to reduce their solid wastes and must provide EPA with their waste reduction goals along with yearly progress reports. EPA in turn provides technical assistance to member companies and allows the use of the WasteWi\$e logo for promotional purposes. (Contact: Lynda Wynn 202-260-0700 or the WasteWi\$e Hotline at 800-372-9473)

Climate Wise Recognition Program

The Climate Change Action Plan was initiated in response to the U.S. commitment to reduce greenhouse gas emissions in accordance with the Climate Change Convention of the 1990 Earth Summit. As part of the Climate Change Action Plan, the Climate Wise Recognition Program is a partnership initiative run jointly by EPA and the Department of Energy. The program is designed to reduce greenhouse gas emissions by encouraging reductions across all sectors of the economy, encouraging participation in the full range of Climate Change Action Plan initiatives, and fostering innovation. Participants in the program are required to identify and commit to actions that reduce greenhouse gas emissions. The program, in turn, gives organizations early recognition for their reduction commitments; provides technical assistance through consulting services, workshops, and guides; and provides access to the program's centralized information system. At EPA, the program is operated by the Air and Energy Policy Division within the Office of Policy Planning and Evaluation. (Contact: Pamela Herman 202-260-4407)

NICE³

The U.S. Department of Energy and EPA's Office of Pollution Prevention are jointly administering a grant program called The National Industrial Competitiveness through Energy, Environment, and Economics (NICE³). By providing grants of up to 50 percent of the total project cost, the program encourages industry to reduce industrial waste at its source and become more energy-efficient and cost-competitive through waste minimization efforts. Grants are used by industry to design, test, demonstrate, and assess the feasibility of new processes and/or equipment with the potential to reduce pollution and increase energy efficiency. The

program is open to all industries; however, priority is given to proposals from participants in the pulp and paper, chemicals, primary metals, and petroleum and coal products sectors. The program has worked with the petroleum industry to evaluate the feasibility of using a closed-loop solvent extraction system to recover organic material from solid wastes normally disposed of off-site. (Contact: DOE's Golden Field Office 303-275-4729)

VIII.C. Trade Association/Industry Sponsored Activity

VIII.C.1. Environmental Programs

Global Environmental Management Initiative

The Global Environmental Management Initiative (GEMI) is made up of group of leading companies dedicated to fostering environmental excellence by business. GEMI promotes a worldwide business ethic for environmental management and sustainable development, to improve the environmental performance of business through example and leadership. In 1994, GEMI's membership consisted of about 30 major corporations including Amoco Corporation.

Amoco - U.S. EPA Pollution Prevention Project

The Amoco - U.S. EPA Pollution Prevention Project was a voluntary joint project to study pollution prevention opportunities at an industrial facility. The Amoco Oil Company's refinery at Yorktown, Virginia was used to conduct a multi-media assessment of releases to the environment, then to develop and evaluate options to reduce these releases. The project identified pollutant release points and cost effective pollution prevention techniques. In addition, a number of important observations were made relating to: differences in TRI estimated releases and actual releases, regulatory obstacles to implementing pollution prevention programs, and incentives for pollution prevention. A project summary report was issued in January 1992.¹¹²

API Residual Management Survey

The American Petroleum Institute (API) has conducted yearly surveys of residual materials generation and residual management practices at refineries. The survey collects data on about 30 different waste streams, their management techniques and pollution prevention activities of API members. A yearly report is issued titled, "Generation and Management

of Residual Materials.” This report is available from the American Petroleum Institute.

API Groundwater Research Program

API conducts research to assist the petroleum industry in dealing with its groundwater contamination problems. The research is aimed at the problems faced by the petroleum industry, including petroleum refineries, but is made available to those outside the industry as well. Research studies evaluate techniques and develop new methods to detect, monitor and cleanup groundwater contamination. Numerous manuals and reports have been published and periodic conferences and workshops on groundwater monitoring and cleanup techniques are sponsored.

Compendium of Waste Minimization Practices

The American Petroleum Institute sponsored a waste minimization practices compendium in the Summer of 1990 to summarize waste minimization techniques for oil and gas exploration and production, refining and marketing industries. The compendium contains a literature survey and case studies.

Petroleum Environmental Research Forum

The Petroleum Environmental Research Forum is an industry group that shares research costs and findings that relate particularly to the petroleum industry. The Forum has funded research on pollution prevention in the industry.

API STEP Program

The STEP (Strategies for Today's Environmental Partnership) program was developed by API member companies to address public environmental concerns by improving the industry's environmental, health, and safety performance; documenting performance improvements; and communicating them to the public. The foundation for STEP is the API Environmental Mission and the API Guiding Environmental Principles. The program also includes a series of environmental strategic plans; a review and revision of existing industry standards; documentation of industry environmental, health, and safety performance; and mechanisms for obtaining public input. In 1992, API endorsed, as part of STEP, adoption of management practices as an API recommended practice. The management practices contain the following elements: pollution prevention, operating and process safety, community awareness, crisis readiness, product stewardship, proactive government interaction, and resource conservation. The management practices are an outline of actions to help companies incorporate environmental health and safety concerns

into their planning and decision making. Each company will make its own decisions on how and whether to change its operations. API has developed a compilation of resources that provide recommendations and guidance on various operational areas of the oil industry to assist API members with their implementation of the management practices. (Contact: Walter Retzch, API, 202-682-8598)

VIII.C.2. Summary of Trade Associations

The trade and professional organizations serving the petroleum refining industry are either specific to petroleum refining or to the petroleum production, refining and distribution as a whole. Further differences in membership are based on company size and ownership. More specifically, the large, multinational oil companies are members of industry-wide trade groups and the small, independent petroleum refiners are members of both industry-wide and small, independent trade groups. The major trade organizations are discussed below.

American Petroleum Institute

1220 L St. NW
Washington, DC 20005
Phone: (202) 682-8000
Fax: (202) 682-8030

Members: 300
Staff: 400
Contact: Alison Kerester

The American Petroleum Institute (API) is the largest trade group for the petroleum refining industry, with the largest membership and budget. API represents the major oil companies, and independent oil producers, refiners, marketers, and transporters of crude oil, lubricating oil, gasoline, and natural gas. API conducts and promotes research in the petroleum industry and collects data and publishes statistical reports on oil production and refining. Numerous manuals, booklets, and other materials are published on petroleum refining to assist members in environmental compliance.

National Petroleum Refiners Association

1899 L St. NW 1000
Washington, DC 20036
Phone: (202) 457-0480
Fax: (202) 457-0486

Members: 370
Staff: 28
Contact: Norbert Dee, Ph.D.

The National Petroleum Refiners Association (NPRA) was founded in 1902 and represents virtually all domestic refiners and petrochemical manufacturers using processes similar to refineries. NPRA's membership includes both large companies and many small and independent companies.

Mid-Continent Oil and Gas Association

801 Pennsylvania Ave. NW

Suite 840

Washington, DC 20004

Phone: (202) 638-4400

Fax: (202) 638-5967

Members: 7500

Staff: 6

Contact: Mr. Modiano

The Mid-Continent Oil and Gas Association was founded in 1917 and represents oil and gas producers, royalty owners, refiners, gasoline manufacturers, transporters, drilling contractors, supply and equipment dealers and wholesalers, bankers, and other individuals interested in oil business.

American Independent

Refiners Association/

Western Independent

Refiners Association

801 S. Grand Ave., 10th Fl.

Los Angeles, CA 90017

Phone: (213) 624-8407

Members: AIRA: 27, WIRA: 9

Contact: Craig Moyer

The American Independent Refiners Association (AIRA) was founded in 1983 and represents independent oil refiners and companies that supply services to the independent refining industry. The Western Independent Refiners Association (WIRA) was founded later to address the specific needs of refiners on the west coast. The associations are separate, but closely affiliated with many of the members of WIRA also members of AIRA. Neither organization has a full-time staff. Much of the associations' activities are carried out by members and outside consultants. Through the associations' cooperative environmental services, members are each responsible for a federal or state agency and/or office, monitoring the environmental issues, and reporting to members. Outside consultants are hired to look at safety and environmental compliance issues.

Western States Petroleum Association

505 N. Brand Blvd., Ste. 1400

Glenda

le, CA 91203
Phone: (818) 545-4105

Members: 60

The Western States Petroleum Association was founded in 1917 and represents oil and gas producers, royalty owners, refiners, gasoline manufacturers, transporters, drilling contractors, supply and equipment dealers and wholesalers, bankers, and other individuals interested in the oil business.

IX. CONTACTS/ACKNOWLEDGMENTS/RESOURCE MATERIALS/BIBLIOGRAPHY^f

For further information on selected topics within the petroleum refining industry a list of contacts and publications are provided below:

Contacts

Name	Organization	Telephone	Subject
Tom Ripp	EPA/OECA	(202) 564-7003	Regulatory requirements and compliance assistance
Ken Garing	EPA/NEIC	(303) 236-3636	Industrial processes and regulatory requirements (Air)
Linda Tekrony	EPA/NEIC	(303) 236-3636	Industrial processes and regulatory requirements (RCRA)
Jim Durham	EPA/OAR	(919) 546-5672	Regulatory requirements (Air)
Ron Kirby	EPA/OW	(202) 260-7168	Regulatory requirements (Water)
Max Diaz	EPA/OSWER	(202) 260-4786	Regulatory requirements (Solid waste)
Meg Kelly	EPA/OSWER	(703) 308-8748	CSI lead - Source reduction
Katherine Keith	EPA/Region V	(312) 353-6956	Inspections, regulatory requirements (Air), and enforcement
Ken Cooper	EPA/Region VI	(713) 983-2148	Inspections and regulatory requirements (Water, RCRA and TSCA)
John Kim	EPA/Region IX	(415) 744-1263	Inspections and regulatory requirements (Air)
Paul Boys	EPA/Region X	(206) 553-1567	Inspections and regulatory requirements (Air)
Gregory Filas	DOE/EIA	(202) 586-1347	Industry financial information
Nancy Johnson	DOE/OFE	(202) 586-6458	Environmental issues
Alison Kerester	API	(202) 682-8346	Federal environmental requirements
Norbert Dee, Ph.D.	NPRA	(202) 457-0480	Federal environmental requirements

OECA: Office of Enforcement and Compliance Assistance
 NEIC: National Enforcement Investigations Center
 OAR: Office of Air and Radiation
 OW: Office of Water
 OSWER: Office of Solid Waste and Emergency Response
 EIA: Energy Information Administration
 OFE: Office of Fossil Energy
 API: American Petroleum Institute
 NPRA: National Petroleum Refiners Association

General Profile

^f Many of the contacts listed above have provided valuable background information and comments during the development of this document. EPA appreciates this support and acknowledges that the individuals listed do not necessarily endorse all statements made within this notebook.

The U.S. Petroleum Industry: Past as Prologue, 1970-1992, Energy Information Administration, September, 1993. (DOE/EIA-0572)

Petroleum: An Energy Profile, Energy Information Administration, August, 1991. (DOE/EIA-0545(91))

U.S. Industrial Outlook 1994, Department of Commerce.

1992 Census of Manufacturers Preliminary Report Industry Series: Petroleum and Coal Products, Bureau of the Census, June 1994. (MC92-1-29A(P))

Process Descriptions

Petroleum Refining - Technology & Economics, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.

Petroleum Refining for the Non-Technical Person, 2nd ed., William L. Leffler, PennWell Publishing Company, Tulsa, Oklahoma, 1985.

Handbook of Petroleum Refining Processes, Meyers, R.A., McGraw-Hill Book Company, New York, 1986.

Petroleum Refining Distillation, Watkins, R.N., Gulf Publishing, Inc., Houston, TX, 1979.

Petroleum Refinery Enforcement Manual, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.

Release Profiles

Compilation of Air Pollutant Emission Factors, 3rd ed., Ch. 9, William M. Vatauvuk, August 1977.

Assessment of Atmospheric Emissions from Petroleum Refining, R.G. Wetherold, Radian Corporation, Austin, Texas and U.S. EPA, Office of Research and Development, Washington, DC, April, 1980. (EPA-600/2-80-075e)

Petroleum Industry Environmental Performance, Third Annual Report, American Petroleum Institute, Washington, DC, 1995.

Petroleum Refinery Enforcement Manual, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.

Hazardous Waste Generation: 1. Petroleum Refining, U.S. EPA, Office of Solid Waste, January 1994.

Amoco - U.S. EPA Pollution Prevention Project, Yorktown, Virginia, Project Summary, U.S. EPA, January 1992.

The Generation and Management of Wastes and Secondary Materials in the Petroleum Refining Industry: 1987-1988, American Petroleum Institute, February 1991. (API Pub. no. 4530)

Generation and Management of Wastes and Secondary Materials: Petroleum Refining Performance, 1989 Survey, American Petroleum Institute, June 1992. (API Pub. no. 303)

Generation and Management of Wastes and Secondary Materials: Petroleum Refining Performance, 1990 Survey, American Petroleum Institute, August 1993. (API Pub. no. 324)

Generation and Management of Wastes and Secondary Materials: Petroleum Refining Performance, 1991 Survey, American Petroleum Institute, May 1994. (API Pub. no. 329)

Toxics Release Inventory, Public Data Release, 1992, U.S. EPA, Office of Pollution Prevention and Toxics, April, 1994. (EPA 745-R-94-001)

Dioxin and Furans - A Primer: What They Are and How to Measure Them, American Petroleum Institute, Washington, DC, March 1990.

Refinery Wastewater Priority Pollutant Study - Sample Analysis and Evaluation of Data, American Petroleum Institute, Washington, DC, December 1981.

Environmental Design Considerations for Petroleum Refining Crude Processing Units, American Petroleum Institute, February 1993. (API Pub. no. 311)

Pollution Prevention

Hazardous Waste Minimization: Part V Waste Minimization in the Petroleum Industry, Leeman, J.E., JAPCA 38, no. 6, June 1988.

Waste Minimization in the Petroleum Industry a Compendium of Practices, American Petroleum Institute, November 1991. (API Pub. no. 3020)

Amoco - U.S. EPA Pollution Prevention Project, Yorktown, Virginia, Project Summary, U.S. EPA, January 1992.

Case Study: Identifying Pollution Prevention Options For a Petroleum Refinery, Balik, J.A., and Koraido, S.M., Pollution Prevention Review, Summer 1991.

New Catalyst Designs Meet Environmental Challenges of the 1990's, Corbgett, R.E., Oil & Gas Journal, October 1, 1990.

Dry Scrubber Reduces SO₂ in Calciner Flue Gas, Brown, G.W., Roderick, D., and Nastri, A., Oil & Gas Journal, February 18, 1991.

Innovative Improvements Highlight FCC's Past and Future, Avidan, A.A., Edwards, M., Owen, H., Oil & Gas Journal, January 8, 1990.

Pollution Prevention: Strategies for Petroleum Refining (Fact Sheet), Center for Hazardous Materials Research (CHMR), Pittsburgh, PA.

Pollution Prevention Opportunities in Petroleum Refining (Fact Sheet), U.S. EPA Region III, Philadelphia, PA, October, 1990.

Pollution Prevention Opportunities Checklists, County Sanitation Districts of Los Angeles County, January 1991.

Regulatory Profile

Sustainable Environmental Law, Environmental Law Institute, West Publishing Co., St. Paul, Minn., 1993.

Issues Affecting the Refining Sector of the Petroleum Industry, Hearings Before the Committee on Energy and Natural Resources, United States Senate, Washington, DC, May 19, 1992, Cheyenne, WY, May 28, 1992, U.S. GPO, Washington, DC, 1992.

Costs to the Petroleum Industry of Major New and Future Federal Government Environmental Requirements, American Petroleum Institute, Washington, DC, October 1993. (API Discussion Paper #070R)

U.S. Petroleum Refining: Meeting Requirements for Cleaner Fuels and Refineries, Volumes I-VI, National Petroleum Council Committee on Refining, U.S. Department of Energy, August 1993.

U.S. Petroleum Strategies in the Decade of the Environment, Williams, Bob, Penn Well Books, Tulsa, OK, 1991.

Environmental Related Issues Taking Their Turn in Restructuring Industry, Williams, Bob, Oil & Gas Journal, January 22, 1990.

Clean Air Act Complicates Refinery Planning, Scherr, R.C., Smalley, G.A., and Norman, M.E., Oil & Gas Journal, May 27, 1991.

Clean Air Amendments Put Big Burden on Refinery Planners, Scherr, R.C., Smalley, G.A., and Norman, M.E., Oil & Gas Journal, June 10, 1991.

U.S. Regs Cause Refiners to Rethink Wastewater Systems, Norman, M.E., Kapoor, S., Smalley, G.A., and Daniel, B.M., Oil & Gas Journal, June 1, 1992.

U.S. Refiners Choosing Variety of Routes to Produce Clean Fuels, Ragsdale, R., Oil & Gas Journal, March 21, 1994.

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END NOTES

1. *1992 Census of Manufacturers Preliminary Report Industry Series: Petroleum and Coal Products*, Bureau of the Census, June 1994. (MC92-I-29A(P))
2. *Petroleum: An Energy Profile*, Energy Information Administration, August, 1991. (DOE/EIA-0545(91), p. 5.
3. *Petroleum Refining for the Non-Technical Person*, 2nd ed., William L. Leffler, PennWell Publishing Company, Tulsa, Oklahoma, 1985.
4. *Petroleum: An Energy Profile*, Energy Information Administration, August, 1991. (DOE/EIA-0545(91))
5. Standard Industrial Classification Manual.
6. *United States Refining Capacity*. Washington, D.C.: National Petroleum Refinery Association, January 1, 1994.
7. *1992 Census of Manufacturers Industry Series: Petroleum and Coal Products*, Bureau of the Census, June 1994. (MC92-I-29A)
8. Ibid.
9. *1992 Census of Manufacturers Industry Series: Blast Furnaces, Steel Works, and Rolling and Finishing Mills*. Bureau of the Census, May 1994. (MC92-I-29A)
10. *1992 Census of Manufacturers Industry Series: Petroleum and Coal Products*. Bureau of Census, 1987 (MC92-I-29A).
11. *United States Refinery Capacity*. Washington, D.C.: National Petroleum Refinery Association, January 1, 1994.
12. *The U.S. Petroleum Industry: Past as Prologue, 1970-1992*, Energy Information Administration, September, 1993. (DOE/EIA-0572)
13. *U.S. Industrial Outlook 1994*, Department of Commerce.
14. Ibid.
15. API comments on draft document.
16. Statement of the American Petroleum Institute.
17. Statement of the American Petroleum Institute, Issues Affecting the Refining Sector of the Petroleum Industry, Hearings Before the Committee on Energy and Natural Resources, United States Senate, Washington, DC, May 19 and 28, 1992, U.S. Government Printing

Office,
Washington, DC: 1992.

18. *U.S. Industrial Outlook 1994*, Department of Commerce.
19. *U.S. Industrial Outlook 1994*, Department of Commerce.
20. Lichtblau, John H., Petroleum Industry Research Foundation, Inc., New York, NY. Prepared statement for the Hearings before the Committee on Energy and Natural Resources, United States Senate, One Hundred Second Congress, Second Session, on the Issues Affecting the Refining Sector of the Petroleum Industry, Washington, DC, May 19, 1992. U.S. Government Printing Office, Washington: 1992. ISBN 0-16-039466-X.
21. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.
22. Ibid.
23. Ibid.
24. U.S. EPA. *Development Document for Effluent Limitation Guidelines: New Source Performance Standards and Pretreatment Standards for the Petroleum Refining Point Source Category*. Ruddy, D., Project Officer, Office of Water Regulations and Standards, Washington, D.C.: U.S. EPA, October 1982.
25. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.
26. *Assessment of Atmospheric Emissions from Petroleum Refining*, R.G. Wetherold, Radian Corporation, Austin, Texas and U.S. EPA, Office of Research and Development, Washington, DC, April, 1980. (EPA-600/2-80-075e)
27. U.S. EPA. *Development Document for Effluent Limitation Guidelines: New Source Performance Standards and Pretreatment Standards for the Petroleum Refining Point Source Category*. Ruddy, D., Project Officer, Office of Water Regulations and Standards, Washington, D.C.: U.S. EPA, October 1982.
28. *Petroleum Refining for the Non-Technical Person*, 2nd ed., William L. Leffler, PennWell Publishing Company, Tulsa, Oklahoma, 1985.
29. *Assessment of Atmospheric Emissions from Petroleum Refining*, R.G. Wetherold, Radian Corporation, Austin, Texas and U.S. EPA, Office of Research and Development, Washington, DC, April, 1980. (EPA-600/2-80-075e)
30. U.S. EPA. *Development Document for Effluent Limitation Guidelines: New Source Performance Standards and Pretreatment Standards for the Petroleum Refining Point Source*

Category. Ruddy, D., Project Officer, Office of Water Regulations and Standards, Washington, D.C.: U.S. EPA, October 1982.

31. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.

32. *Petroleum Refining for the Non-Technical Person*, 2nd ed., William L. Leffler, PennWell Publishing Company, Tulsa, Oklahoma, 1985.

33. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.

34. Ibid.

35. Ibid.

36. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.

37. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.

38. U.S. EPA. *Development Document for Effluent Limitation Guidelines: New Source Performance Standards and Pretreatment Standards for the Petroleum Refining Point Source Category.* Ruddy, D., Project Officer, Office of Water Regulations and Standards, Washington, D.C.: U.S. EPA, October 1982.

39. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.

40. Ibid.

41. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.

42. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.

43. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.

44. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.

45. Ibid.

46. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.
47. U.S. EPA. *Development Document for Effluent Limitation Guidelines: New Source Performance Standards and Pretreatment Standards for the Petroleum Refining Point Source Category*. Ruddy, D., Project Officer, Office of Water Regulations and Standards, Washington, D.C.: U.S. EPA, October 1982.
48. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.
49. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.
50. U.S. EPA. *Development Document for Effluent Limitation Guidelines: New Source Performance Standards and Pretreatment Standards for the Petroleum Refining Point Source Category*. Ruddy, D., Project Officer, Office of Water Regulations and Standards, Washington, D.C.: U.S. EPA, October 1982.
51. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.
52. Personal interviews with EPA staff and comments on draft document by API.
53. U.S. EPA. *Development Document for Effluent Limitation Guidelines: New Source Performance Standards and Pretreatment Standards for the Petroleum Refining Point Source Category*. Ruddy, D., Project Officer, Office of Water Regulations and Standards, Washington, D.C.: U.S. EPA, October 1982.
54. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.
55. Provided by Carole L. Engelder, PhD, PE, Amoco Corporation, Permitting and Operating Services, Texas City, Texas, May 1995.
56. Ibid.
57. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.
58. Ibid.
59. *Petroleum Refining for the Non-Technical Person*, 2nd ed., William L. Leffler, PennWell Publishing Company, Tulsa, Oklahoma, 1985.
60. Ibid.

61. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.
62. Ibid.
63. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.
64. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.
65. Ibid.
66. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.
67. Ibid.
68. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.
69. *Handbook of Petroleum Refining Processes*, Meyers, R.A., McGraw-Hill Book Company, New York, 1986.
70. *Petroleum Refining for the Non-Technical Person*, 2nd ed., William L. Leffler, PennWell Publishing Company, Tulsa, Oklahoma, 1985.
71. Personal interviews with EPA staff.
72. *Assessment of Atmospheric Emissions from Petroleum Refining*, R.G. Wetherold, Radian Corporation, Austin, Texas and U.S. EPA, Office of Research and Development, Washington, DC, April, 1980. (EPA-600/2-80-075e)
73. Wetherold, R.G., Radian Corporation. *Assessment of Atmospheric Emissions from Petroleum Refining: Volume 5. Appendix F*. U.S. Environmental Protection Agency, Washington, DC, 1980. EPA-600/2-80-075e.
74. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.
75. *Petroleum Refinery Enforcement Manual*, U.S. EPA Office of Enforcement, by PEDCo Environmental Inc., Arlington, Texas, March 1980. EPA-340/1-80-008.
76. *Petroleum Refining - Technology & Economics*, Gary & Handwerk, 3rd Edition, Marcel Dekker, Inc., New York, N.Y., 1994.

77. *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Chapter 9, Petroleum Industry*. U.S. EPA, Office of Air and Radiation, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, U.S. Government Printing Office, Washington, D.C., September 1985.
78. *Costs to the Petroleum Industry of Major New and Future Federal Government Environmental Requirements*. American Petroleum Institute, Washington, D.C., October 1993.
79. Amoco - U.S. EPA Pollution Prevention Project, Yorktown, Virginia, Project Summary, January 1992.
80. *The U.S. Petroleum Industry: Past as Prologue, 1970-1992*, Energy Information Administration, September, 1993. (DOE/EIA-0572)
81. Ibid.
82. Ibid.
83. Ibid.
84. Ibid.
85. Ibid.
86. Ibid.
87. *Sustainable Environmental Law*, Environmental Law Institute, West Publishing Co., St. Paul, Minn., 1993.
88. 40 CFR Part 60.
89. *Sustainable Environmental Law*, Environmental Law Institute, West Publishing Co., St. Paul, Minn., 1993.
90. 40 CFR Part 61.
91. 40 CFR Part 262.
92. Telephone interviews with EPA staff.
93. 40 CFR Part 262.
94. *Sustainable Environmental Law*, Environmental Law Institute, West Publishing Co., St. Paul, Minn., 1993.
95. Telephone interviews with EPA staff.

96. 40 CFR Part 268.
97. 40 CFR Parts 403 and 419.
98. Telephone interviews with EPA staff.
99. *Sustainable Environmental Law*, Environmental Law Institute, West Publishing Co., St. Paul, Minn., 1993.
100. Ibid.
101. 40 CFR Parts 313, 302, and 304.
102. *Sustainable Environmental Law*, Environmental Law Institute, West Publishing Co., St. Paul, Minn., 1993.
103. Ibid.
104. Telephone interview with CARB staff.
105. *Issues Affecting the Refining Sector of the Petroleum Industry, Hearings Before the Committee on Energy and Natural Resources, United States Senate, Washington, DC, May 19, 1992, Cheyenne, WY, May 28, 1992*, U.S. GPO, Washington, DC, 1992.
106. *Sustainable Environmental Law*, Environmental Law Institute, West Publishing Co., St. Paul, Minn., 1993.
107. Telephone interview with EPA staff.
108. *The U.S. Petroleum Industry: Past as Prologue, 1970-1992*, Energy Information Administration, September, 1993. (DOE/EIA-0572)
109. Telephone interview with EPA staff.
110. *The Clean Air Act Amendments: Strategies for the 1990s*. Hale and Dorr, Counsellors and Law and TRC Environmental Consultants, Inc.
111. Telephone interview with EPA staff.
112. Amoco - U.S. EPA Pollution Prevention Project, Yorktown, Virginia, Project Summary, January 1992.